

The Office of Environment, Safety and Health and its Office of Nuclear and Facility Safety (NFS) publishes the Operating Experience Weekly Summary to promote safety throughout the Department of Energy (DOE) complex by encouraging feedback of operating experience and encouraging the exchange of information among DOE nuclear facilities.

The Weekly Summary should be processed as an external source of lessons-learned information as described in DOE-STD-7501-96, *Development of DOE Lessons Learned Programs*.

To issue the Weekly Summary in a timely manner, the Office of Operating Experience Analysis and Feedback (OEAF) relies on preliminary information such as daily operations reports, notification reports, and, time permitting, conversations with cognizant facility or DOE field office staff. If you have additional pertinent information or identify inaccurate statements in the summary, please bring this to the attention of Jim Snell, 301-903-4094, or Internet address jim.snell@hq.doe.gov, so we may issue a correction.

Readers are cautioned that review of the Weekly Summary should not be a substitute for a thorough review of the interim and final occurrence reports.

Operating Experience Weekly Summary 97-29

July 11 through July 17, 1997

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EVENTS

1. EMPTY FUEL CANISTER DROPPED AT IDAHO

On July 11, 1997, at Idaho National Engineering Laboratory, fuel-handling personnel dropped an empty fuel canister approximately 12 feet while moving it into a fuel storage area. During canister movement, the operators noticed that the lifting bail of the canister was not properly engaged with the crane hook. They were trying to place the canister back into a shuttle bin when the canister fell. The canister landed vertically and fell to a horizontal position on the floor within a few feet of the fuel storage racks. The fuel storage area is an extremely high radiation area with no personnel access allowed. Dropping fuel canisters can result in nuclear safety concerns, equipment damage, or personnel injury. (ORPS Report ID--LITC-FUELCSTR-1997-0009)

Investigators determined that fuel-handling personnel were moving the canister from the fuel-handling cave to its designated storage location in the fuel storage area. They placed a lid on the canister in the cave and moved it to the fuel storage area using the shuttle bin. They lifted the canister from the shuttle bin and attempted to store it in storage racks using the overhead crane. Investigators have not yet determined if either the canister or the concrete floor was damaged. Figure 1-1 shows the layout of the Irradiated Fuel Storage Facility.

Operators use a remote fuel-handling crane to move fuel canisters in the fuel storage facility. Personnel perform the operations remotely, viewing movement of the crane through a 4 foot by 4 foot window in the control room. A crane-mounted camera provides some additional visibility. The crane contains a motor-operated latching device that engages directly to the bale on the canister. The bale is on the canister lid, and the lid is locked in place. However, because of the angle of the latching device relative to the viewing angles, the operators could not see if the device was completely engaged.

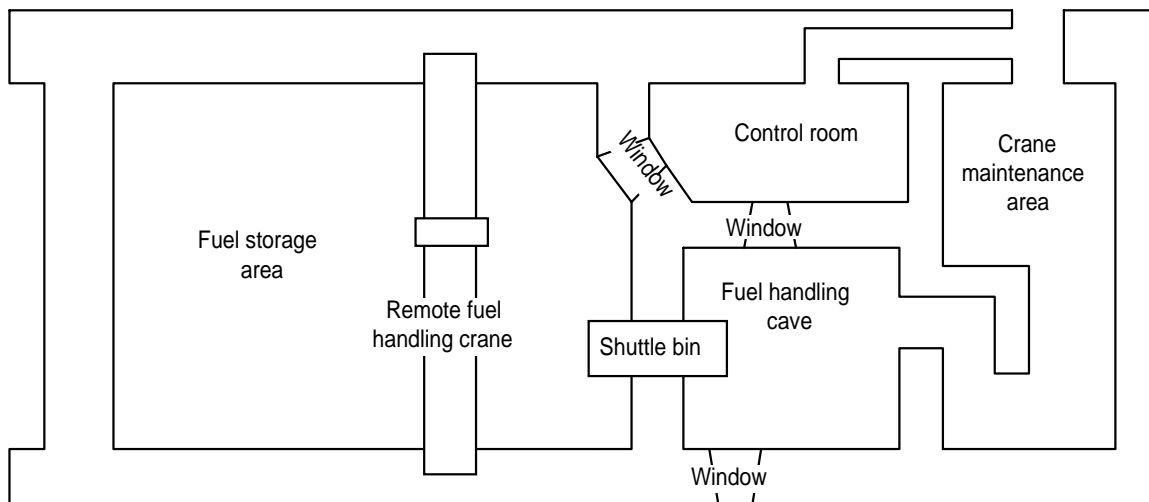


Figure 1-1. Layout of the Irradiated Fuel Storage Facility

Although the investigation is continuing, investigators have determined that the camera needs to be re-installed for better operator viewing. This is the second event at Idaho where the corrective actions included evaluating modifications to this camera for better viewing. NFS reported the first event in Weekly Summary 95-44. On October 26, 1995, operators violated a technical standard when they failed to verify identification of a fuel storage canister before moving it. As a result, they retrieved the wrong canister. Investigators determined that the camera position on the crane was poorly designed and was a contributing cause to the event. However, after evaluating proposed modifications to the camera, investigators determined that the cost was not justified. (ORPS Report ID—LITC-FUELCSTR-1995-0012)

DOE-STD-7501-95, *Development of DOE Lessons Learned Programs*, was developed, in part, to prevent recurrences of negative events. The standard outlines the necessary program elements for lessons learned programs. DOE-HDBK-7502-95, *An Easy-Reference Guide to Implementing the DOE Lessons Learned Standard*, discusses how to implement an effective lessons learned program. DOE/EH-0504, Safety Notice 95-03, *Lessons Learned Programs*, states: "Once identified, corrective actions must be implemented if they are to have a positive impact. The handbook advises that timeliness and assignment to a responsible party are important elements of corrective action implementation. The longer it takes to implement an action, the higher the probability that the event the recommendations were intended to prevent will occur." Facility managers should review their programs against the standard and handbook to determine if the guidance is effectively implemented.

KEYWORDS: crane, dropped load, lessons learned

FUNCTIONAL AREAS: Materials Handling/Storage, Lessons Learned

2. THREE POSTING VIOLATIONS AT MOUND

Operating Experience Analysis and Feedback Engineers reviewed three occurrence reports for posting violations at Mound. On June 26, 1997, three decontamination workers entered a radiological material area posted as restricted entry without authorization. On June 10, 1997, an operator in the Tritium Emission Reduction Facility entered a room posted as a radiological material area with restricted entry without authorization. On January 30, 1997, four workers in the Semi-Works Facility entered a room posted as requiring respirator protection without respirators. These events resulted in violations of radiological postings and could have resulted in contamination of the workers. (ORPS Reports OH-MB-EGGM-EGGMAT04-1997-0006, OH-MB-EGGM-EGGMAT01-1997-0014, and OH-MB-EGGM-EGGMAT01-1997-0002)

On June 26, 1997, a worker observed three decontamination workers placing trash from the radiological restricted entry area in a roll-off area and contacted a radiological control representative. The radiological control representative discovered that the decontamination workers entered the area without contacting radiological operations personnel, placed potential low-level trash in the roll-off area without radiological coverage, and had no radiological work permit for the work. He surveyed the workers for external contamination and found none. Investigators determined that the workers did not read the radiological postings before entering the area.

On June 10, 1997, an operator did not read a radiological area posting that radiological control technicians had changed earlier in the day. He entered a room without authorization and stayed approximately 5 minutes before a radiological control technician discovered him and escorted him from the area. The operator was not contaminated. Although radiological control technicians implemented appropriate barriers against room entry, the operator may have been complacent toward familiar postings.

On January 30, 1997, four workers entered a room where maintenance work requiring respiratory protection was performed the previous day. Radiological personnel had not completed surveys needed before removing the respiratory protection posting. Although the room was still posted, the workers entered without respirators. Investigators determined that the area was properly posted but the posting was not clearly visible because it was located at the bottom of the entry door instead of at eye level. The four workers were not contaminated.

NFS reported other events where postings were violated in Weekly Summaries 97-18, 97-06, 96-37, 96-26, 96-25, 96-05, and 95-18. Also, Hanford reported a similar posting violation to the Occurrence Reporting and Processing System (ORPS) database on July 14, 1997.

- Weekly Summary 96-05 reported that on January 24, 1996, at the Savannah River Site, a laundry worker violated radiological control postings and procedures when he entered a shed posted as a contamination area without reading the radiological postings. The laundry worker did not wear protective clothing, did not sign on the radiological work permit, and did not have the proper level of training. Investigators determined that the posting was obscured when the worker's helper opened the doors to the shed. (ORPS Report SR--WSRC-REACP-1996-0002)
- On July 11, 1997, at Hanford, a radiological control technician violated radiological control postings when he entered a posted contamination area because the posting was obscured. The contamination area door was properly posted. However, the door was propped open, and the technician entered the area without seeing the posting. The technician immediately recognized the error, performed a whole body survey, and exited the area. He also closed the doors and put up a rope barrier with radiological postings. The technician was not contaminated. His actions may have prevented other workers from entering the area by mistake and potentially becoming contaminated. (ORPS Report RL--PHMC-TPLANT-1997-0012)

Entry requirements to radiological controlled areas may change depending on the conditions inside the area. Postings should be updated to communicate the changing radiological conditions. Training should emphasize reviewing entry requirements before each entry and having a questioning attitude when unexpected postings are encountered. Failure to comply with facility radiological postings could endanger the health of workers, plant safety, and the environment.

DOE/EH-0256T, *Radiological Control Manual*, section 231, "Posting Requirements," states that radiological posting shall be used to alert personnel to the presence of radiation and radioactive material and to aid them in minimizing exposures and preventing the spread of contamination. Section 123, "Worker Responsibilities," states that trained personnel should recognize that their actions directly affect contamination control, personnel radiation exposure, and the overall radiological environment associated with their work. The first rule of worker responsibility is to obey posted, written, and oral radiological control instructions and procedures, including radiological postings. Personnel working at DOE facilities are responsible for complying with rules to ensure personal safety. Facility managers should communicate a sound policy stressing that safety is of prime importance and that all personnel must exhibit an individual commitment to excellence and professionalism.

The Price-Anderson Amendments Act, issued in 1988, subjects Department of Energy contractors to civil penalties for violations of DOE rules, regulations, and compliance orders relating to nuclear safety requirements. Congress also requires DOE to take enforcement actions against those contractors who violate nuclear safety rules. Two final rules have been issued: *Quality Assurance Rule* (10 CFR 830.120) and *Occupational Radiation Protection For Workers* (10 CFR 835). Part 835 requires training and periodic retraining in (1) general radiation safety for all workers, (2) fundamentals of radiation protection and as low as reasonably achievable principles for all

radiological workers, (3) fundamentals of radiation protection, and (4) procedures for maintaining exposures as low as reasonably achievable for radiological control technicians. Retraining is generally required at 2-year intervals. Enforcement action can be taken if DOE identifies radiological protection training deficiencies and the contractor does not respond in a timely manner.

KEYWORDS: radiation protection, decontamination, radiation area

FUNCTIONAL AREAS: Radiation Protection, Work Planning

3. SHIFT SUPERVISOR'S QUALIFICATIONS EXPIRE

On July 10, 1997, at Idaho National Engineering Laboratory, during an assessment, DOE personnel discovered that a shift supervisor's qualifications had expired, violating facility technical safety requirements. Shift supervisors must maintain their qualifications by reviewing checklists of operator requirements and completing written exams every 2 years. Technical safety requirements require shift supervisors to maintain their qualifications. Continuing training programs are necessary to ensure personnel maintain and improve their skills and are aware of physical and procedural changes to facilities, changes to regulatory requirements, and lessons learned that can affect job performance. (ORPS Report ID--LITC-TANO-1997-0001)

Investigators determined that the shift supervisor's training expired approximately 1 month before DOE personnel discovered it. They determined that procedures allow re-qualification training to be completed within a grace period of 30 days from the date initial training was completed. Investigators determined that the Training Department based the supervisor's re-qualification date on a previous re-qualification training that she completed within the 30-day grace period rather than on the date of her initial training. Investigators continue to review this event and will determine corrective actions when the investigation is complete.

NFS reported training issues in Weekly Summaries 97-05, 96-50, 95-31, 95-17, and 95-13.

- On January 23, 1997, at the Savannah River Site FB-Line, a waste generating custodial officer discovered that the annual Resource Conservation and Recovery Act (RCRA) training for six waste-handling operators had expired. While conducting an internal audit, the officer found operators had performed RCRA-related waste-handling activities after their annual training expired on November 30, 1996. The qualifications matrix used at the time of the event did not track the qualification expiration dates. (ORPS Report SR--WSRC-FBLINE-1997-0006)
- On December 6, 1996, at the Pantex Plant, during a review of personnel qualification/certification records, Manufacturing Division personnel identified a production technician who had performed work without being fully qualified. The technician had completed all required job-specific training, but lacked courses on general work practices required by plant procedures. Certification of assigned workers was part of the authorization basis. (ORPS Report ALO-AO-MHSM-PANTEX-1996-0236)
- On July 24, 1995, at the Hanford Plant, a shift manager worked as part of a minimum-shift crew with an expired certification. Operational safety requirements specified certification of shift personnel before they could be part of a minimum-shift crew. Investigators found that certifications had expired or would have expired by August 2, 1995, for 50 percent of the shift managers. (ORPS Report RL--WHC-PFP-1995-0040)

Operating Experience Analysis and Feedback engineers searched the Occurrence Reporting and Processing System database for occurrences where personnel training, qualifications, or certifications had expired and found nine occurrences DOE-wide. Facility managers reported that the root cause of five of those events was either inadequate administrative control or work organization/planning deficiency.

These events illustrate the need for training coordinators and facility managers to review their training program records and controls to ensure that staff are qualified and certified for the tasks to which they are assigned. Employees should also accept the responsibility for meeting qualification requirements. Record tracking should be used to identify training expiration dates so that re-training can be correctly scheduled. Supervisors should be able to easily track progress of both entry-level and re-qualification participants. See article 1 under Price-Anderson Amendments Act Information for related information on training records.

DOE O 5480.20, *Personnel Selection, Qualification, Training, and Staffing Requirements at DOE Reactor and Non-Reactor Nuclear Facilities*, states that the purpose of the Order is to assure that all persons are qualified to carry out their assigned responsibilities. Chapter I, sections 7.a.(1) and 7.a.(2), provide requirements for developing and maintaining training to meet the position requirements. Training department personnel also need to rigorously apply the principles and requirements of a systematic approach to training (for example, performance-based training) as defined in chapter I.7.b of the Order. This chapter provides a discussion of elements that contribute to a successful program for initial and continuing training. Requirements for initial and continuing training can be found in chapters I.7.c and I.7.d. DOE-STD-1060-93, *Guide to Good Practices for Continuing Training*, chapter 7, discusses good practices for tracking of training records.

KEYWORDS: training and qualification, technical safety requirement, supervisor

FUNCTIONAL AREAS: Training and Qualification, Lessons Learned

4. CHEMICAL FUMES RESULT IN BUILDING EVACUATION

On July 2, 1997, at the Lawrence Livermore National Laboratory, a hazardous waste technician created fumes when he added a mixture of nitric acid, hydrogen fluoride, and acetic acid to a carboy containing a mixture of ethanol, hydrofluoric acid, and water. The reddish fumes reached the building gas detectors and triggered the building evacuation system. All building occupants evacuated to their assembly areas. Fire Department personnel responded and took control of the scene. There were no personnel injuries or equipment damage. Investigators determined that the fumes resulted from a chemical reaction of incompatible materials. The National Institute for Occupational Safety and Health guidelines state that nitric acid is incompatible with alcohols. Incorrect mixing of chemicals has the potential to cause fire, explosions, toxic gas generation, or waste streams that create disposal problems. (ORPS Report SAN--LLNL-LLNL-1997-0037)

The hazardous waste technician was transferring chemicals from 1-liter containers to the larger 5-gallon carboy for transfer to a waste accumulation area. The reaction occurred when a solution of 300 ml of ethanol, 75 ml of hydrofluoric acid, and 75 ml of water mixed with a solution of 1,980 ml of 70 percent nitric acid, 180 ml of hydrogen fluoride, and 180 ml of acetic acid. The fumes triggered building alarms. The Fire Department's Hazmat Team suited up with protective clothing and self-contained breathing apparatus and entered the building. They moved the carboy into an exhaust hood to control the fumes generated by the reaction. High Purity Gas Team members, dressed in protective suits and self-contained breathing apparatus, re-entered the building, determined the hazard was clear, and re-set the alarms. An incident analysis committee assembled to determine the cause of the incident and identify corrective actions. The investigation continues.

NFS has reported on numerous chemical events at DOE facilities. Weekly Summaries 96-38, 93-40, 92-23, and 92-21 reported on the following events involving mixing of chemical wastes.

- On September 13, 1996, at the Hanford Analytical Laboratory, a chemical technologist working in a fume hood heard a pressure release and saw yellow smoke and liquid spray coming from a bottle of mixed waste in a nearby fume hood. Investigators determined that another technologist had added 750 ml of hydrochloric acid to a 4-liter waste collection bottle that contained distilled water, cerium nitrate solution, neodymium nitrate solution, hydrofluoric acid, anhydrous ethanol, nitric acid, sulfuric acid, and hydrochloric acid. (ORPS Report RL--WHC-ANALLAB-1996-0035)
- On October 1, 1993, at the Argonne National Laboratory — East, workers discovered a ruptured nalgene chemical waste container stored in a waste acid storage cabinet. The container held ethanol, nitric acid, and hydrochloric acid. The acid-alcohol mixture ruptured the container with sufficient force to jar open the cabinet door, spilling acid and alcohol on the floor. (ORPS Report CH-AA-ANLE-ANLEAPS-1993-0006)
- On September 24, 1992, a 2-gallon nalgene bottle exploded at the National Renewable Energy Laboratory. The bottle contained a chemical waste mixture of sulfuric acid, hydrogen peroxide, and nitric acid. The explosion occurred approximately 10 minutes after facility personnel closed the container. (ORPS Report CH-NA-NREL-NREL-1992-0007)
- On September 15, 1992, at the West Valley site, an exothermic reaction resulted in the rupture of a 1-liter bottle containing an organic waste solution (ethanol and acetone). The contents became reactive when a technician loosened the lid on the bottle. The technician immediately placed the bottle in a hood, where the bottle overpressurized and ruptured. (ORPS Report ID--WVNS-AEL-1992-0006)

These events highlight the need for chemical workers to properly identify and understand the risks involved when working with hazardous chemicals. In facilities where hazardous chemicals are used, workers should be trained in the proper methods for handling, mixing, and storing these chemicals. Facility procedures should provide instructions concerning safe limits for mixing and chemical compatibility. It is important to keep records of the types and quantities of chemicals when mixing chemical wastes. The following chemical combinations should be avoided.

- halogenated solvents and non-halogenated solvents
- acids and bases (check the pH of aqueous wastes before mixing)
- inorganic acids and organic acids
- oxidizers and organic material
- heavy metals and solvent wastes
- oxidizing acids (nitric, chromic, perchloric) and other acids

National Research Council Publication ISBN 0-309-05229-7, *Prudent Practices in the Laboratory: Handling and Disposal of Chemicals*, 1995, section 7.B.3, "Collection and Storage of Waste," provides information and guidance for the accumulation and temporary storage of chemical wastes. The section also states that it is imperative to know the identity of all chemicals and understand their compatibility before mixing them. Information on how to order this book can be obtained from the National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC 20418, (202) 334-3313.

In June 1997, NFS issued DOE/EH-0557, Safety Notice 97-01, "Mixing and Storing Incompatible Chemicals." The notice contains lessons learned related to the mixing and storing of incompatible chemicals. It also references a list of chemical incompatibilities provided by the University of Michigan. A copy of the chemical incompatibility list is available on the Internet at URL <http://www.orcbs.msu.edu/chemical/chp/appendixc.html>. Safety Notice 97-01 can be obtained by contacting the Info Center, (301) 903-0449, or by writing to ES&H Information Center, U.S. Department of Energy, EH-72/Suite 100, CXXI/3, Germantown, MD 20874. Safety Notices are also available on the Operating Experience Analysis and Feedback Home Page at http://tis.eh.doe.gov:80/web/oeaf/lessons_learned/ons/ons.html.

The Office of Environment, Safety and Health provided information about the hazards associated with mixing of incompatible chemicals in DOE/EH-0296, Bulletin 93-2, "Mixing of Incompatible Chemicals," February 1993. DOE Defense Programs Safety Information Letters, SIL 96-05, *Compatibility Considerations in the Mixing of Waste Chemicals*, November 1996, and SIL 96-01, *Incidents from Chemical Reactions due to Lack of or Failure to Follow Proper Handling Procedures*, June 1996, address these issues and provide guidance to prevent these incidents.

KEYWORDS: chemical reaction, fumes, waste

FUNCTIONAL AREAS: Chemistry, Industrial Safety, Materials Handling and Storage

PRICE-ANDERSON AMENDMENTS ACT (PAAA) INFORMATION

1. PRELIMINARY NOTICE OF VIOLATION FOR ALTERATION OF CERTIFICATION PROGRAM RECORDS

On June 5, 1997, the Department of Energy (DOE) Office of Enforcement and Investigation issued a Preliminary Notice of Violation under the Price-Anderson Amendments Act to the Pantex Plant. The notice addressed the alteration of certification program records used by the contractor to verify that workers performing nuclear-weapons-related work met position certification

requirements. Office of Enforcement and Investigation staff conducted an investigation in December 1996. They concluded that violations of the information requirements of 10 CFR 820.11 probably occurred at Pantex. These violations included (1) recording false information on time sheets and in the training records and certification database to maintain certification status of production technicians for weapon dismantlement work, (2) performing weapons work without a currently certified production technician present, and (3) altering an original pre-operational checklist after a copy had been provided to DOE. [NTS Report NTS-ALO-AO-MHSM-PANTEX-1996-0008; letter, DOE (T. O'Toole) to Mason and Hanger Corporation (W. Weinreich), 06/05/97]

On December 4, 1996, the Office of Enforcement and Investigation's Director of Enforcement initiated a preliminary investigation to determine whether violations of DOE nuclear safety requirements occurred during work performed at the Pantex Plant in late 1996. The Director of Enforcement initiated the investigation because employees expressed concerns regarding the accuracy of work-proficiency records. The employees alleged that on November 27, 1996, three uncertified production technicians worked on two nuclear weapons. Allegedly, the technicians performed the work without a certified production technician present in the bay, as required by the contractor's internal operating procedure. There was also a concern that the contractor assigned other uncertified production technicians to work on processes without a certified production technician present. A production technician also questioned the accuracy of a weapon certification record relating to his work on October 5, 1996. This certification is a prerequisite for production technicians performing unsupervised weapons work.

Investigators determined that three production technicians had completed training required for qualification but had not accumulated the required work-proficiency hours required for current certification. The production manager did not check their certification status because he believed two of them were certified. The operations manager, who supervised the technicians, did not believe it was necessary to routinely check workers' continued certification status before each assignment. Investigators also learned that contractor personnel added initials and back-dated the original pre-operational checklist for November 27, 1996. They altered the records at the direction of a supervisor after a copy had been provided to DOE Area Office personnel. Contractor personnel asserted that they modified the original checklist because it was not completed properly when they performed the pre-operational checks.

Investigators determined that records documenting certification of a production technician to perform nuclear weapon dismantlement work were false. These records reflected that the production technician performed a total of 20 hours of on-the-job work-proficiency activities in October 1996. Performance of work-proficiency hours is a prerequisite to retain certification for continuing unsupervised dismantlement work after initial qualification and certification. During the investigation, the production technician maintained that he had never performed the work on the days indicated in the records. Evidence indicates that personnel purposely manipulated work-proficiency records to inflate the number of proficiency hours worked by production technicians to make it appear that the technicians were earning work-proficiency hours when they were not.

Contractor training requirements for production technicians require certain individuals to maintain proficiency by performing at least 10 hours of work in each 3-month period in the job task for which certification is required. Operations involving technical or support activities that require certification must be performed or supervised by certified individuals only to comply with Plant procedures. Procedures also require the operations manager/supervisor to verify certification status before assigning work. The operations supervisor normally verifies production technician certification by reviewing the weapon certification report or the training records certification database.

Mason and Hanger Corporation, the management and operating contractor for the Pantex Plant, had its Internal Audit and Assurance Division initiate an expanded audit of the Plant's weapons program (refer to article 3 for Pantex training event). Mason and Hanger Corporation responded

to the Preliminary Notice of Violation within the 30-day period for response and admitted to the violations. The Director of Enforcement acknowledged the contractor's response and the Preliminary Notice of Violation became a final order. No further action was taken.

The Price-Anderson Amendments Act subjects DOE contractors to civil penalties for violations of DOE rules, regulations, and compliance orders relating to nuclear safety requirements. The Office of Enforcement and Investigation may reduce a base civil penalty by up to 100 percent when a DOE contractor promptly identifies a violation, reports it to DOE, and undertakes timely corrective action. Additionally, the enforcement policy allows DOE discretion to not issue a notice of violation in certain cases. The Noncompliance Tracking System (Weekly Summaries 95-17, 95-20) provides a means for contractors to promptly report potential noncompliances and take advantage of these mitigation provisions in the enforcement policy.

KEYWORDS: training, certification, Price-Anderson Act

FUNCTIONAL AREAS: Training and Qualification

OEAF FOLLOWUP ACTIVITIES

1. CORRECTION TO WEEKLY SUMMARY 97-28, ARTICLE 3

OEAF engineers have received information from the Hanford facility representative that resulted in the following corrections to Article 3 of Weekly Summary 97-28.

- The event occurred on June 20, 1997, not on June 23, 1997.
- The device described as a safety interlock was actually a safety alarm.
- The casks operators lifted after the "two-blocking" occurred weighed 115,000 pounds rather than 15,000 pounds.

This new information was received by OEAF engineers after the Weekly Summary was printed. OEAF engineers greatly appreciate the positive support and feedback we receive while developing the Weekly Summary.

KEYWORDS: crane, rigging

FUNCTIONAL AREAS: Hoisting and Rigging